Table 2. Summary of Industrial Hygiene and Environmental Studies, Sandia Building 807

Date	Subject	Code	Area	Method	Synopsis
9/13/1977	Lithium Compounds	A3 D4	Room 3096	Resp fit in field w/ irritant fume, issued MSA Comfo II	Work w/Li aluminate, hydroxide, oxide, and Na oxide. Powders are weighed, transferred, hot pressed, etc. Dust is irritating to nose and throat. Hood avail, some dusty operations can't be performed in it.
10/1/1979	Lead	A1 D1	Room 2058	Notified of bioassay program.	Worker indicates on questionairre several times per year he visits plant areas where he may be exposed to Pb oxide and other metal oxides.
12/3/1979	Benzene MR	A6 D1	Room 3024	_	An MR was placed for 12 qts of benzene. The solvent used in liquid chromatograph. No exposures anticipated.
8/25/1980	Lab Hood	1-6 4-2	Room 3081	Inspector put fan back in service.	Operator reported subject hood not drawing air. Hood used to control solvent vapors. Hood exhaust fan had shut down.
4/30/1981	Hg Survey	A1	Room 1030	No mention of method employed for survey.	Survey area where Hg is placed on electrical contacts. Work done in limited area without a hood. No Hg vapors detected in breathing zone of worker. Also, no Hg detected on lab bench.
3/3/1982	Benzene Chloroform	A6	Room 1019	Used in lab hood and with gloves.	MR for 4 qts of benzene, and 4 bottles of chloroform. Used in 25 mL quantities for dissolution of polystyrene.
8/3/1983	Lead Compounds	A1	Room 3118	Used in chemical fume hood w/ gloves.	PR for 300 grams of Pb tetra-acetate. Used in concentrated aqueous soln, as "scrubber" for H selenide
3/28/1985	Hg Survey	A1	Room 2512	Survey done w/ Jerome Hg vapor detector.	Worker requested survey of work area. Started using a Hg parosimeter. Concentrations didn't approach TWA-TLV (0.05 mg/m³).
4/18/1985	Meth. Cl, Hexane	A6	Room 3013	Used lab hood and w/ Viton gloves. Personal air samples collected.	Worker used small quantities of meth. Cl and hexane in organic syntheses. Concentrations well below TLV of 50 ppm-n hexane and 100 ppm for meth. Cl.
12/11/1986	TCE	A6	Room 2030	Checked lab hood	100 cc TCE used inside a down draft hood. No solvent vapor released into breathing zone. Solvent poured into a snap-top safety can for disposal. No skin contact made.
2/21/1989	Ethylene Oxide	A4	Room 205	In house survey of ethylene oxide use in the lab.	Worker complained of odor while using EtO in the vacuum system. Bottle of EtO not properly affixed to the system. Valve on bottle w/in 2 ft of many ignition sources. Gas manifold not in an enclosure and exhausted to outside. No SOP. Fix all probs, temp modifications by Kirk Air and Plant Engineer design new system for suitable handling of EtO.
2/24/1989	Ethylene Oxide	A4	Room 2098	EtO followup (in house)	Improper use and handling of EtO lead to recommendations to correct deficiencies. Engineering modifications found to be adequate for safe use of EtO.

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Date	Subject	Code	Area	Method	Synopsis
2/15/1990	Methanol Acetone	A6	Room 3053	Air samples w/ gilian low flow sampler and Si gel tubes, 3M 3500 model OVMs. Analysis, GC-FID by SNL.	Worker operates an IR chromatography. Soln prep done under hood, but carries samples w/ acetone and methanol 3-4 ft to IR machine. Results show non-detectable amounts of acetone and methanol.
5/14/1991	Thallium TCE	A2	Room 3113	TI = CPL 2-2.43A, surface wipes. TCE=3M 3520 OVM, drager tubes for ST exposure. No analysis of samples noted.	Tl and TCE monitoring to determine exposure during routine processes (cleaning of the evaporative deposition system for thin film semiconductor work). All individuals' exposure limits were well below the PELs for Tl and TCE. Also no discoloration of drager tubes during use of TCE to remove mounting adhesive. Swipes revealed very little surface contamination. One high area (153.5 ug/100 cm²) was the table where the Mettler scale was-put it inside the hood.
11/18/1991	HG	A1	Room 3019	Conducted by Sandia employee with a Jerome Gold Film Hg Vapor Analyzer	Survery requested to check Hg contamination in a lab after some Hg contaminated equipment had been removed from the area. Only visible Hg were 2-3 tiny balls inside a plastic open-topped container inside a hood. Several readings were taken throughout the lab, all gave concentrations of 0.00 mg/m ³ .
5/14/1993	Exposure Assessment	D8	Room 2083	Investigation conducted by Sandia employee.	Survery performed to complaint of employee that she experienced change in sleeping habits (went from 6-8 hrs to 10-12 hrs) and feeling lethargic since Jan, 1993. Dimethyl formamide use was prioritized as moderate, monitoring will be done 5/17 and 5/24. Also monitor for volatilized organics and CO ₂ . Due to diesel odor, IH dept suggests installing a bank of activated charcoal filters in the air stream supplied by the fresh air intake located in the center of the bldg.
7/7/1993	Exposure Assessment	D8	Room 1030, 1030A, 3089, 1022	Investigation conducted by Sandia employee. Also, Rockwell Laser evaluated and inventoried lasers.	Monitoring by IH Dept should be done for solvents with a risk ranking of moderate. The hood in cleanroom 3089 was only 10% exhausted. 1,2-dichloroethane, an IARC 2B carcinogen used in hood. Odor threshold higher than PEL. MeCl may also be used. Natl Fire Protect Assoc says air exhausted from lab hoods shall not be recirculated. Since this hood recirculates 90% of the air and the odor thresholds of the 2 chem are higher than the PELs, this cleanrm hood should not be used.
8/26/1993	Organic Vapors	A5	Rooms 3089 and 1030	STELs collected according to OSHA CPL 2-2.43. Charcoal tubes used and analyzed by Dept. 7711 by gas chrom w/FID. 3M 3500 OVMs used for 8-hrs and anaylzed like the tubes.	Monitoring conducted in response to IH investigation of laminar flow hood mentioned above. Sampling conducted for acetone, 1,2-dichloroethane, MeCl, THF. All airborne conc well below the TWAs and STELs for the 4 organic solvents. Based on results, the small quantities used plus the activated charcoal filter in the hood are effective in reducing airborne exposures. If quantities are increased, monitor again. Also investigate modifying hood for 100% exhaust due to high odor thresholds of 1,2-dichloroethane and MeCl.

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Date	Subject	Code	Area	Method	Synopsis
9/3/1995	IAQ-Fishy Air Smell	D9	Room 1086M	Conducted by Sandia employee	IH response to "fishy smell" present on and off for 2 weeks. Investigation revealed a defective light ballast causing the smell. IH called Telecon, who repaired the light and the smell went away.
3/19/1996	IAQ-Airborne and allergen dust	D9	Rooms 1086, 1086C, 1086W	Survey conducted by Mark Wong of Sandia. No indication of sample method/lab. Results compared to ASHRAE Std for airborne dust and TLVs for allergens	Airborne dust was below OSHA general stds and ASHRAE IAQ guidelines. Bulk dust samples were taken from settled dust on surfaces and in crevices. The samples were analyzed for common indoor allergens: cat, dog, dust mite, and cockroach. Results showed presence of dog allergens at moderate levels: 1086-63 ug/g, 1086W-96.0 ug/g. Recommended level for dog allergen dust is <20 ug/g.
3/19/1996	IAQ-Temp, RH, CO2	D9	Room 1086	Survey conducted by Mark Wong of Sandia. Data compared to ASHRAE recommendations.	Temp(F): Ave=72.3, Lo/time=62.4/9:02, Hi/time=73.5/16:07. RH(%): Ave=15.3, Lo/time=12.8/0:02, Hi/time=24.2/9:02. CO ₂ (ppm): Ave=666, Lo/time=555/9:02, Hi/time=744/16:12. ASHRAE winter temp range is 68-76F. ASHRAE RH is 30% to 60% (evidence indicates RH of 5-30% not an increased health risk). ASHRAE CO ₂ is 1000 ppm or less.
3/19/1996	IAQ-Chem pollutants	D9	Room 1086	Survey conducted by Mark Wong of Sandia. No mention of method/lab. Results compared to ASHRAE guidelines and OSHA/ACGIH stds.	No detection of VOCs from air samples. Formaldehyde levels detected below ASHRAE IAQ guidelines (0.1 ppm) and the OEL (0.75 ppm). CO, NO ₂ , and SO ₂ , are combustion byproducts. Their source may be either internal or external to the bldg. Results indicate concentrations of these chemicals in air below acceptable limits as specified by OSHA, ACGIH, and ASHRAE.
3/20/1996	IAQ-Airborne and allergen dust	D9	Rooms 1031N, 1031G, 1031, 1085, 1085B, 1085M	Survey conducted by Mark Wong of Sandia. No indication of sample method/lab. Results compared to ASHRAE Std for airborne dust and TLVs for allergens	Concentrations of airborne dust were below OSHA general stds and AHRAE IAQ guidelines. Bulk dust samples taken from settled dust on surfaces and in crevices were analyzed for common indoor allergens: cat, dog, dust mite, and cockroach. Results showed presence of dog and cat allergens at moderate levels: 1031N-26.0 ug/g dog, 1085-63.5 ug/g dog, 1085B-21.0 ug/g cat and 200.0 ug/g dog, 1085M-21.0 ug/g cat and 77.0 ug/g dog. Recommended levels for dog and cat allergen dust is <20 ug/g.
3/20/1996	IAQ-Temp, RH, CO ₂	D9	Room 1031	Survey conducted by Mark Wong of Sandia. Data compared to ASHRAE recommendations.	Temp(F): Ave=73.5, Lo/time=72.8/9:25, Hi/time=74.3/18:35. RH(%): Ave=16.9, Lo/time=15.4/18:00, Hi/time=19.9/9:25. CO ₂ (ppm): Ave=683, Lo/time=635/5:50, Hi/time=886/9:25. Results generally within ASHRAE rec. winter temp range of 68-76 with some deviations. ASHRAE recs RH at 30-60%, current evidence indicates RH in 5-30% range not an increased health risk. CO ₂ at or below 1000 ppm.

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Date	Subject	Code	Area	Method	Synopsis
3/20/1996	IAQ-Chem pollutants	D9		Survey conducted by Mark Wong of Sandia. No mention of method/lab. Results compared to ASHRAE guidelines and OSHA/ACGIH stds.	No detection of VOCs from air samples. Formaldehyde levels detected below ASHRAE IAQ guidelines (0.1 ppm) and the OEL (0.75 ppm). CO, NO2, and SO2, are combustion byproducts. Their source may be either internal or external to the bldg. Results indicate concentrations of these chemicals in air are below the acceptable limits as specified by OSHA, ACGIH, and ASHRAE.
3/21/1996	IAQ-Temp, RH, CO2	D9	Room 1085	Survey conducted by Mark Wong of Sandia. Data compared to ASHRAE recommendations.	Temp(F): Ave=74.4, Lo/time=70.2/0:07, Hi/time=80.3/16:32. RH(%): Ave=14.2, Lo/time=12.9/20:37, Hi/time=19.1/9:07. CO ₂ (ppm): Ave=616, Lo/time=514/3:27, Hi/time=933/9:52.
3/21/1996	IAQ-Chem pollutants	D9		Survey conducted by Mark Wong of Sandia. No mention of method/lab. Results compared to ASHRAE guidelines and OSHA/ACGIH stds.	No detection of VOCs from air samples. Formaldehyde levels detected below ASHRAE IAQ guidelines (0.1 ppm) and the OEL (0.75 ppm). CO, NO2, and SO2, are combustion byproducts. Their source may be either internal or external to the bldg. Results indicate concentrations of these chemicals in air are below the acceptable limits as specified by OSHA, ACGIH, and ASHRAE.
11/01/99- 01/31/00	IAQ- Formaldehyde samples		1086N, 1019, outside air	NIOSH 2541 and EPA TO-11. Analyzed by RSKCo IH Lab in Dallas, TX.	Air sampling results for formaldehyde were ND and below the LOQ when collected and analyzed by NIOSH methods. Results for same samples collected and analyzed by EPA methods showed detectable levels but less than the 8-hr TWA of OSHA (0.75 ppm). Data is in question because measured levels of form in assoc field blanks exceeded or were near the values reported for the actual samples.
11/01/99- 01/31/00	IAQ-VOCs and Hg		1053, 1019, outside air	VOCs=RSKCo Method 9 & 11, Hg=NIOSH 6009. Analyzed by RSKCo in Dallas, TX	Air sampling results for 35 VOCs and Hg were reported as ND at levels below the LOQ.
11/01/99- 01/31/00	IAQ-Total dust	D9		NIOSH 0500 by RSKCo in Dallas, TX	The total dust gravemetric analysis results were either ND or were detected at levels below the OSHA 8-hr TWA exposure limits for PNOS (15 mg/m³).
11/01/99- 01/31/00	IAQ-Surface wipes	D9		NIOSH 7300. Analysis by RSKCo in Dallas, TX	Analytical results showed detectable levels of all metallic elements in varying concentrations except Sb, Se, and Tl. ie: ceiling diffuser outside rm 1085C/D=836 ug/ft² Pb, ceiling diffuser outside rm 1085D/E=2323 ug/ft², N ceiling diffuser in rm 1086W=762 ug/ft².

Table 2. Summary of Industrial Hygiene and Environmental Studies, Sandia Building 807

Date	Subject	Code	Area	Method	Synopsis
11/01/99- 01/31/00	IAQ-Surface wipes	D9	•	NIOSH 7300. Analysis by RSKCo in Dallas, TX	Analytical results showed detectable levels of all metallic elements in varying concentrations except Se and Tl. With the expection of Be, applicable regulatory limits for surface wipe levels don't exist. Surface wipe samples are typically used as measures for adequacy of industrial housekeeping and are not used to represent employee exposure.
11/01/99- 01/31/00	IAQ-Bulk dust samples	D9	Air handlers and wall mounted heating units	Air handlers = EPA 7471. Analysis by General Engineering Labs in Charleston, SC. Wall mts=NIOSH 7300 Analysis by RSKCo	Bulk dust samples collected from the air handlers were analyzed for 22 metallic elements: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, Hg, K, Se, Ag, Na, Tl, V, and Zn. Except for Tl, results showed detectable levels of all metallic elements in the analysis. Bulk dust samples collected from wall mounted heating units were analyzed for Sb, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Tl, V, and Zn. Analytical results concentrations at or below the LOQ.
11/01/99- 01/31/00	IAQ-Air filter material	D9		NIOSH 7300. Analysis by RSKCo in Dallas, TX	Used air filters were analyzed for a variety of metallic elements. No significant concentrations were found, analytical results showed concentrations to be barely above or below the LOQ.
11/01/99- 01/31/00	IAQ-Soil Data	D9	Outside bldg 807	EPA 7471. Analysis by Armstrong Forensic Lab in Arlington, TX.	Analytical results for surface soil samples showed Hg at ND levels below the LOQ.
11/01/99- 01/31/00	IAQ-Water Data	D9			Analytical results for water samples indicated an absence of total and fecal coliform. Samples also analyzed for presence of Al, As, Cu, Pb, and Fe. Results showed metals at levels below the LOQ with the exception of Fe. Cl was measured at the time of sample collection and determined to be within the recommended range of 0.2 ppm to 2.0 ppm.
11/7/1999	IAQ-Building Air Handler Assessment	D9	Building 807	Jeff Downs of Sandia (7122 Industrial Hygiene).	Assessment done to determine if general air handler operating conditions could negatively affect air quality and if past repairs are in good condition. Results conclude the cont need for general maintainence. Such as, the removal of rust build-up from condensate drip pans located inside the air handlers, removal of dirt located on internal air handler floors and walls, air handler filter replacement/change-out, and removal of dirt and debris from the outside air intake plenums. Past repairs were in good condition.
11/22/1999	Water Quality	C1	2nd flr womens rm sink and kitchen sink	Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	Water quality was tested and free of total and fecal coliforms. Cu, Pb, Fe Al and As concentrations were below the EPA MCLs. And residual Cl was in the range of 0.2 to 2.0 mg/L as recommended for effective chlorination.

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Date	Subject	Code	Area	Method	Synopsis
1/19/2000	Personal Monitoring	A1		NIOSH 7300, analysis performed by RSKCo IH Lab, Dallas, TX by ICP-AES.	In response to employee concerns, personal breathing zone air monitoring was conducted to determine potential airborne exposures to 16 metals: As, Sb, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Mo, Ni, Va, Zn, Se, Th. 4 samples were collected on each of the 3 flrs, 12 total. 5 media and 5 field blank samples were also collected. No detectable As, Sb, Be, Co, Fe, Pb, Mo, Ni, Va, Se, or Tl was found in any of the personal samples of media/field blanks. Detectable levels of Cr, Cu, and Zn were in all 12 samples and the field/media blanks (probable background levels in filter media). On 2 differ employees Ca (0.000010 mg/m³) and Mn (0.0029 mg/m³) were detected. In all cases, the 8-hr TWAs for the samples were less than the OELs.
1/25/00 1/26/00	Water Quality	C1		Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	Fire flow test of hydrants was conducted on 1/24/00. This caused increased pressure in water lines that feed the building. The water was reported to be visibly brown. 8 samples in bldg 807 were collected after flushing was done. 4 were analyzed for total and fecal coliform and 4 were analyzed for Cu, Pb, Fe, and Mn. All results for the metals were below the EPAs MCL and all results for coliform were absent. Residual Cl was in the range of 0.2 to 2.0 mg/L as recommended for effective chlorination.
2/1/00 3/23/00	Dust Samples and HVAC components		wall, distribution plenum	Samples analyzed w/ a combo of IS, Raman spect, X-ray diffr, and X ray fluor. Analyses performed at the Sandia Labs.	Samples were a door gasket from the induction unit dr, acoustic liners from the N and E walls, and dust from the other locations. Sampling in regard to "black dust" discharged from HVAC to determine composition and possible source. Ceiling diffuser dust sample had organic(cellulose, protein mat, mat similar to Sterglaze Type A.P.) and inorganic parts (charcoal, CaCO3, SiO2, feldspars, clays). HVAC system samples inorganic-C,CaCO3, SiO2, feldspars, clays (probably from mat circulating throughout rather than a part of the HVAC). Dr gasket mat and acoustic liners are contributors to diffuser dust. HVAC wall unit dust samples had organic mat: thermosetting acrylic resin/polyvinyl acetate emulsion particles, polyvinyl acetate/acrylate copolymer fiber,cellulose acetate fibers,dialdehyde starch binder particles, phenolic particles, hydroxyethylated starch particles, and black particles from dr gasket and acoustic liner backing. A glassy Na-K-Al silicate mat of variable composition and a "waxy, white/black sticky mat" = maybe fatty acids. HVAC dust inorganic mat: inorganic C w/ differ thermal history than ceiling diff.

Table 2. Summary of Industrial Hygiene and Environmental Studies, Sandia Building 807

Date	Subject	Code	Area	Method	Synopsis
3/6/2000	Water Quality	C1	1st-3rd flr fountains, 1st- 3rd flr kitchen sinks	Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	A main water line had ruptured causing the water in bldg 807 to be visibly brown. 12 grab samples were collected before flushing; hence, considered a worst case scenario. 6 samples were analyzed for Cu, Pb, Fe and Mn. 6 samples were analyzed for total and fecal coliform. The following metals were above the EPA MCL: Pb levels from the kitchen sinks on 1st (0.027 ppm), 2nd (0.024 ppm), and 3rd flrs (0.020 ppm) compared to the EPA MCL of 0.015 ppm for Pb. Fe levels from 1st flr sink, 2nd flr fountain, and 2nd flr sink, and the 3rd flr sink. And Mn from 1st flr sink (0.22 ppm), 2nd flr fountain (0.08 ppm), 2nd flr sink (0.2 ppm), and 3rd flr sink (0.18 ppm) compared to the EPA MCL of 0.05 ppm. Since water samples were collected before flushing, the levels above the MCL are expected. The water sampled was free of total and fecal coliform. Residual Cl was in the range of 0.2 to 2.0 mg/L as recommended for effective chlorination.
3/13/2000	Water Quality	C1	1st-3rd flr fountains, 1st- 3rd flr kitchen sinks	Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	A main water line had ruptured causing the water in bldg 807 to be visibly brown. 12 grab samples were collected after the bldg was flushed. Cu, Pb, Fe, and Mn concentrations were below the EPA MCLs. The water was also free of total and fecal coliforms. Residual Cl was in the range of 0.2 to 2.0 mg/L as recommended for effective chlorination.
3/16/2000	Water Quality	C1	· ·	Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	The water was in bldg 807 was visibly brown due to on going construction. 12 grab samples were collected after the bldg was flushed. The 6 samples analyzed for Cu, Pb, Fe and Mn were below the EPA MCls. The 6 samples analyzed for coliform were free of any total and fecal coliform. Residual Cl was in the range of 0.2 to 2.0 mg/L.
4/27/2000	Water Quality	C1	1st-3rd flr fountains, 1st- 3rd flr kitchen sinks	Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	Water in bldg 806 was visibly brown due to repairs done on the hot water heater. Water for bldg 807 wasn't brown but on the same water distribution as 806 so tested for quality control. 12 grab samples were collected after the bldg was flushed. The 6 samples analyzed for Cu, Pb, Fe and Mn were below the EPA MCLs. The 6 samples analyzed for coliform were free of any total/fecal mat. Residual Cl was in the range of 0.2 to 2.0 mg/L.
5/25/2000	Water Quality	C1	& 3rd flr kitchen sinks,	Coliform = State of NM Scientific Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP- AES. Residual Cl tested in field w/Hach Colorimeter.	The water in bldg 807 was visibly brown due to the cleaning of the cooling towers. 12 grab samples were collected after the bldg was flushed. The 6 samples analyzed for Cu, Pb, Fe and Mn were below the EPA MCLs. The 6 samples for coliform were free of any total/fecal material. Residual Cl was in the range of 0.2 to 2.0 mg/L.

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Date	Subject	Code	Area	Method	Synopsis
6/12/2000	Water Quality	C1	3rd flr kitchen sinks	Lab Division. Metals = SNL Dept 7132 Analytical Lab using ICP-	The water in bldg 807 was visibly brown due to disruption of the hot water lines. 12 grab samples were collected after the bldg was flushed. The 6 samples analyzed for Cu, Pb, Fe and Mn were below the EPA MCLs. The 6 samples for coliform were free of any total/fecal material. Residual Cl was in the range of 0.2 to 2.0 mg/L.
3/15/2001	Chemicals	NA	All bldg 807		Spreadsheet of information on various chemicals noted in review of BMHAs, Space Transfers, and Exposure Assessment reports in the IH records for bldg 807. Also spreadsheet for ethylene oxide, methyl acrylate, and acrylamide (which was not found).